

Ransohoff (J.)

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# ANNALS OF SURGERY

A MONTHLY REVIEW OF SURGICAL SCIENCE AND PRACTICE

EDITED BY  
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OCTOBER, 1892.

## The Treatment of Gangrenous Hernia.

By J. RANSOHOFF, M. D., F. R. C. S.,

Cincinnati.





# THE TREATMENT OF GANGRENOUS HERNIA.

By J. RANSOHOFF, M. D., F. R. C. S.,

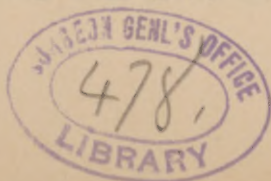
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NOTHING more clearly demonstrates the evolution of surgical thought and practice than a comparison of the questions deemed of prime importance in relation to strangulated hernia at the extremes of two decades.

Prior to 1870, the question to be answered in every case was, "Is the sac to be opened, or not." At present, a condition is hardly to be conceived in which the operator would refrain from opening the peritoneal tunic, thoroughly inspecting the hernial contents and wherever feasible supplementing the relief with the radical operation.

Taxis which then played so prominent a role in all cases has been accorded a more and more subordinate position as its dangers, ever increasing with the age of the strangulation, were more fully appreciated, and in proportion as surgery sought the light for its manipulations in large and open wounds. Then, the teaching of the German and English schools regarding gangrenous hernia prevailed. The oft-encountered sloughing gut was incised and permitted to drain as an abscess. Now the really vital lesson of kelotomy, that in its early performance lies its safety, has been widely learned. Therefore gangrenous hernias are becoming relatively less frequent. Of 27 cases which have come under my observation, only 4 were gangrenous. Three times have I seen gangrene of the intestines; once of the mesentery alone. In one of the former, the strangulation had existed less than 24 hours. Of 170 kelotomies for strangulation in Hagedorn's clinic (1) gangrene, real or suspected, was encountered but 25 times. In Göttingen König (2) had 49





strangulations in 5 years, gangrene being present in 8. Of 61 cases occurring over a period of 12 years in Czerny's clinic (3) 15 were gangrenous. Of 94 cases operated on in the Mass. General Hospital (4) 7 were gangrenous and 2 doubtful.

F. A. Southern (5), of the Manchester Royal Infirmary, reports 85 cases of hernia and among them 9 of gangrene. Thus of 486 cases occurring within about twenty years only 68 or about 14 per cent. were gangrenous or doubtful cases. Clearly, therefore, the experience with this condition of any one man, unless possessed of an unusual clinical material, must be limited. It is therefore by cumulative evidence that the proper management of this most fatal complication of hernia must be evolved. In this belief I venture on the report of the following cases:

*Case 1.* Walter P., æt. 29, farmer, Carlisle, Ky. Rupture of several years' standing. Truss worn, but irregularly. While at work strangulation appeared on the 1st of August, 1889. Continued work for some time and attempted reduction. After 48 hours Dr. Tilton was summoned but taxis failed. The necessity for an immediate operation was urged but it was declined. I saw the patient on the night of the fifth day. Abdominal distension marked. Obstipation; vomiting frequent but not feculent. Pain severe about umbilicus. Great restlessness. Temp. 102°; pulse 100, and full. Scrotal hernia size of fetal head; hard and without impulse on coughing. Skin red and œdematous. Operation by lamp-light. In the hernial sac was fully a half pint of foul-smelling bloody serum. Omental mass as large as a fist; of dark-brown color, putrid and friable; no adhesions to sac. (The latter was a dusky blue in color). There was no intestine in the hernia. After carefully cleansing the sac and its contents and covering the protruded omentum in gauze, the constriction at the internal ring was divided. The omentum was easily drawn into the wound, after severing some slight adhesions. It was ligated and returned to the abdominal cavity. Thorough intra-abdominal drainage through the wound was provided for. Death 24 hours post-operationem from peritonitis. An autopsy was not made.

*Case 2.* Mrs. M. æt. 69. Hernia of 15 (?) years' standing. Has frequently had symptoms of fecal impaction. After a supposed attack of this kind had lasted three days, Dr. J. Marcus was summoned. I saw the patient in the evening of the fourth. There had been fecal vomiting for two days. Aside from a decided dyspnea from which



FIGURE I.  
Dr. Rausohoff's Case of Strangulated Femoral Hernia





the patient suffered at all times, the general condition was not good. There was no elevation of temperature. Pulse irregular.

The appended illustration displays the woman's femoral hernia. Large and lobulated it covered the entire upper and lower part of the thigh. Transverse measurement 11 inches; longitudinal 7 inches. The greater portion of the hernia was soft. In its depths there was an indefinitely outlined mass which was painful on pressure. Believing the case to be one of impaction within the sac and recognizing the gravity of an operation under the conditions present, the patient was anæsthetized with a view to operation if taxis moderately used did not overcome the difficulty. That I did not operate at once was a fatal error. With very little force gurgling was elicited and the mass before mentioned seemed to have subsided. After coming out from the narcosis, the patient's condition was found to be unrelieved. When I saw her next day, she was moribund. *Exit lethal* sixteen hours post operationem.

Autopsy.—On opening the sac it was found to be multilocular; the many diverticula evidently resulting from the lesser resistance of the meshes between the denser fibres of the cribriform fascia. The coils of intestine were for the most part as freely movable as in the abdomen. In one of the saccules an obstruction was found. It was produced by a band as large as a quill. It sprang by a broad base from the free border of a coil of intestine and was attached to the under surface of the mesentery of the same coil. In the loop thus formed a second coil had become entangled.

Above and below the constriction-furrow the bowel was normal. In the constriction groove itself a localized gangrene or rather pressure necrosis had led to a perforation. The aperture is about one-sixth of an inch in diameter; and on the free border of the intestine. There is no fecal extravasation.

The band springs from the ileum about 14 inches from the ileo-cæcal valve. It presents a central cavity which tapers off towards its mesenteric attachment. The character and position of the band make it certain that it is a Meckel's diverticulum. Though often producing acute intestinal obstruction in the belly cavity, I have not been able to find the record of a case where it had given rise to obstruction in a hernia. In this regard the case presented is unique.

*Case 3.* Miss D. æt. 30. Seen with Dr. Jenkins, Newport. No previous history of rupture. While lifting a mattress felt something give way in the groin, four days before operation. Was seen

by Dr. Jenkins on third day, when taxis was attempted. Then vomiting became severe and abdominal pain intolerable. An operation was permitted, hernia large as a walnut. No impulse on coughing, not very tender. Absolute obstruction since inception. Abdomen not distended. General condition very good. On opening the sac several ounces of bloody serum escaped. There presented itself a knuckle of small intestine apparently of the ileum about four inches long of bluish color and moderate distension. The serous covering was glistening. In the centre of the coil opposite to its mesenteric attachment, there was a black gangrenous patch large as a silver quarter and circular in outline.

After carefully cleansing the sac wall and intestine, the constriction at Gimbernat's ligament was divided and then brought into the wound. Although the constriction-furrow was unusually deep there was no evidence of present or probable necrosis. The afferent bowel was considerably larger than the efferent coil, but presented a healthy appearance. Indeed, during the few moments that the hernial contents were being studied with a view to definite action the circulation returned to all of the gut save the gangrenous patch alluded to. It was finally determined to return the entire intestine to the abdominal cavity, retaining by two catgut sutures passed through mesentery and wound margins, the gangrenous surface in absolute relation to the floor of the wound. The latter was lightly packed with gauze, and a sterilized dressing applied over all. The vomiting continued for several hours. Ten hours after the operation the patient had several large and watery evacuations. On the fifth day perforation of the intestine ensued and during two weeks the large portion of the intestinal contents discharged through the fistula. Without other treatment than compression the aperture gradually contracted, and in a little over a month had entirely closed. The process of sloughing was unattended by either local or general reaction. The patient has since remained well.

*Case 4.* Mrs. K. seen with Dr. Harff. Patient, æt. fifty-six, was for many years the subject of an irreducible inguinal-labial hernia of the right side. Has repeatedly suffered from incarceration. Once reduction was accomplished under anæsthesia. While at work on Friday morning, she experienced a sudden and excruciating pain in the hernial protrusion and suffered immediately from nausea and vomiting. Saw the patient twelve hours after first symptoms supervened. The hernial protrusion, large as a cocoanut, was soft and resonant throughout. Impulse on coughing plainly perceptible



in many parts of the mass. From the base of the hernia projecting towards its surface a coil of intestine could easily be outlined and palpated. It was dense, hard and resisting; like a link of tightly-packed sausage in shape and to the touch. Diagnosis, strangulation by band; gangrene probable, notwithstanding the excellent general condition of the patient. It was nearly midnight when I first saw the patient, and necessary assistance was not at hand. The operation was therefore deferred until morning. During the intervening ten hours very extensive effusion into the sac had taken place. The constricted coil could no longer be clearly outlined.

Incision ten inches long in axis of tumor. On opening the sac some half dozen pouches connecting with it were exposed and in them were coils of bowel and adherent omentum. The sac presented the usual appearance of an old reducible hernia. In one of the compartments near the greatly enlarged ring a loop of the bowel had become fixed by a band. The sac, separated from the general cavity, when opened, discharged six or eight ounces of a foul, bloody serum. Within it was a coil of gangrenous bowel. Completely sequestering with gauze the infected area, the constricting band was divided and the sloughing gut brought into the wound for inspection. Along the line of constriction a deep groove had been formed but there was no necrosis. The coil itself was of a dark chocolate color and lusterless. Under its surface, which presented few abrasions, were many hemorrhagic extravasations, chiefly near the free border. Perforation had not taken place. Above and below the constriction groove the intestine seemed normal. The patient's general condition warranting the procedure, primary resection was determined on. Having thoroughly protected the wound, and brought the intestine well down, a gauze cravat was lightly drawn through the mesentery an inch above and below the constriction groove. Excision followed, the mesentery being divided a short distance from the gut and parallel to it. Hemorrhage from the mesentery was free, but no ligatures were required. As the mesenteric wound was brought together by a continuous silk suture beginning at its centre and including its entire thickness, the bleeding points were included within it. When completed the mesenteric suture line measured about four inches. As this suture progressed the intestinal ends naturally approached each other. No clamp was used; the fingers of an assistant answered admirably. The ends were of uniform diameter. For suturing, fine silk and an ordinary cambric needle were used. The suture employed was the continuous Lembert. Particular care was taken at the mesenteric attachment. When completed the suture appeared weak at two

points. These were fortified by additional sutures. The sutured bowel was returned to its sac, the wound thoroughly irrigated and closed except for gauze drainage at its most dependent portion. Time of operation, fifty minutes. Length of gut removed, fourteen inches. Union primary, and recovery uninterrupted. Nineteen months have passed since the operation ; the patient continues well.

The first case presented is of interest in that the omentum is rarely involved in the sloughing process of a gangrenous hernia. B. Schmidt (6) questions altogether the existence of primary strangulation of the omentum. Of Hagedorn's 170 cases (7), gangrenous omentum was only once the sole occupant of the sac.

I have found reports of two other cases—one from Heidelberg (8) ; the other of W. H. Bennett (9) of St. George's Hospital. The safety of the omentum from gangrene is readily found in the ease with which it forms adhesions to the sac wall through which it then receives its nutrition. The case first reported appears to me to put a quietus on the theory long advocated and recently again promoted by Banks, namely, that the constriction ring should not be divided in most cases of gangrenous hernia on the ground that it is a bar to the development of general peritonitis. By the constriction the septic products of the hernia may be isolated for a time. But peritonitis develops from within. In the case presented there was no communication between the sac and the general belly cavity, but just within the neck was the large gut fixed by the adherent omentum, and its wall rendered parietic through traction was unable to resist the passage through it of the organisms which fatally infected the peritoneum. Fortunately there can be but one opinion as to the management of gangrenous omentum. Excision after ligation in healthy tissue, and return to the peritoneal cavity will generally end in recovery unless peritonitis already exists. The three cases quoted all recovered, although in each the radical operation followed that for strangulation. The wisdom of this procedure in all cases might be seriously questioned. In severe cases where peritonitis already exists or is threatened, the last step might advisedly be refrained from and thorough drainage secured. At all events, capillary drainage through gauze can never be harmful. It may be relied upon to forestall the development of

a peritonitis, and where the process already established is yet local, avert a fatal issue.

When gangrene involves the intestine, the solution of the problem is far less easy. Since Ramdohr first successfully resected the gut for hernia in 1727, the possible success of primary excision has been conceded.

Of recoveries there have been many. But the measure, however ideal, has never gained firm footing among surgical procedures. This in face of the fact that the results from the alternative measure, that of the formation of an artificial anus, have been most deplorable. Recently Poulsen reports 29 cases, (10) with but 4 recoveries. Of 35 cases as treated at St. Bartholomew's, 4 were saved (*Brit. Med. J.*, June, '91, i. p. 701). Certain it is that all cases should not be treated alike and that every case ought to be considered with reference, first to the condition of the intestine and its environments, and second the probable ability of the patient to bear the shock of a prolonged operation.

In three of the cases presented many of the changes except those of the afferent portion of the bowel were found. For a strangulation affects the gut either along the line of constriction, at some or all points of the coil involved or in the course of the intestine for a varying distance above the point of constriction. Where the constricting band binds the gut, a well marked groove is made by direct pressure. The constriction, tight enough to occlude the calibre of the bowel, may not interfere with its vascular supply. If gangrene results it will be from pressure at the bottom of the groove and limited in extent. Except for the usually small ulcer in the constriction groove, the gut above and below may be normal in appearance. In the fruitless efforts of nature to protect the general peritoneum, adhesions are quickly formed between bowel and neck of sac. In the attempt to sever these the fragile wall of the bowel tears along the line of constriction. Doubtless many cases of this kind occur, the fecal outpour taking place at the time of the operation. To avoid this it might be wise to follow the practice of Mikulicz (11), who in every case of suspected gangrene opens the ring from within the belly cavity, thus making a laparo-kelotomy which permits as he thinks thorough isolation by gauze of the infected area.



The difficulty appears in the fact that pressure gangrene limited to the furrow and made by the constricting band is not always easily recognized. Fortunately the tissues about it, whether torn by manipulation or not, are in a fair condition for partial excision and lateral suture, by which the patient may be saved the perils and annoyance of an artificial anus. Krumm reports such a case successfully treated, and Barette three of pressure gangrene successfully managed in the same manner. The deleterious effects of strangulation are not equally visited on all parts of the coil. In some cases, as in the fourth presented, the entire knuckle is of dull chocolate or grayish color, with or without subserous hemorrhages. It is soft, friable, gangrenous throughout. In others, as in the second, the force of the strangulation although influencing the circulation of the whole, appears to affect most seriously the central part of the knuckle and at a point removed farthest from the mesentery. It is clear that if in such a case excision were to be done it could only be beyond the limits of constriction. The cyanotic gut about the really gangrenous centre would ill support a suture. Let alone, it will recover. The handling incident to suture might easily prevent it. Furthermore in cases of this nature the gangrene is often more extensive than is apparent. Beginning generally in the mucosa, the serous tissue is the last, and therefore least affected. The fixation of the gangrenous area in the bottom of the wound, relying on nature to make the *anus preternaturalis* appears to me sound judgment. The data on which this view is based differ from those which militate against the formation of a fecal fistula when the gut is gangrenous in its entirety.

First and foremost, the calibre of the gut remains patent, and death from inanition is rendered impossible. Again, artificial anus which results will probably be small and close in a few weeks or months without operative interference. Where the gangrenous area is surrounded by healthy tissue and sufficiently small it may be excised and closed as would be a gunshot wound, or it may be united, as suggested by Lindner (12), and closed by sutures holding the contiguous parts together in horizontal fold. Of the former practice and lateral suture Barette (13) reports 24 cases with 21 recoveries. Sachs (14) reports a case similarly treated with success. When gangrene involves the entire



FIGURE 2.  
(See Page 2.)





knuckle strangulated the appearances are sufficiently characteristic. Chocolate or dark slate colored, denuded in patches of its peritoneum and in a collapsed condition, it fails to react to mechanical or chemical irritation. The odor is fetid before perforation has taken place. Where the strangulation has been very acute, as in the last case reported, the changes in and about the hernia sac need not be very marked. After the escape of a varying amount of turbid bloody fluid from the sac, the latter appears of a bright or dusky-red minus the glistening appearance of the normal serosa. When it is of older date, one after another of the hernial coverings are involved in the inflammation. They are welded together, in turn to break down. A fecal abscess is the result. In the recent strangulation no difficulty is encountered in bringing the intestine into the wound after division of the ring. In that of four or five days, adhesions make this the most delicate part of the operation. It is here that the lesions most difficult to deal with are found, and which, with or without operation, are the most frequent death-causing factors.

The most serious and far-reaching changes in gangrenous hernia are often found in the afferent portion. They may be said to involve its calibre, its nutrition, its contents and the peritoneum singly or together. Although long recognized, the dangers inherent in this part of the intestine have recently been strongly brought forward by Beneke. Above the constriction there is always some dilatation with more or less paresis and congestion of the intestinal wall. It may be darker in color and œdematous from venous stasis. Possibly from the same cause its mucous lining secretes abnormally and as a result at times enormous accumulations of fluid are found: according to Mikulicz from one to three quarts. This forms an excellent culture medium for bacteria and in the process of putrescence toxines are formed, the absorption of which doubtless accounts for many deaths under the mask of acute sepsis from strangulated hernia before peritonitis has developed. The disintegration of this fluid gives rise to a fecal odor irrespective of the site of the constriction, and it is this fluid forced into the stomach and thence regurgitated that is so often mistaken for fecal vomit. (Mikulicz.) Furthermore the wall of a parietic and congested gut has no power to resist the pathogenic organisms which it encloses. Far above the

constriction hemorrhagic infiltrations, diphtheritic-like deposits on, or ulceration of, the mucous membrane, may ensue. This is far more liable to such necrotic changes than the outer tunics and there is no way of knowing how far the process has extended. In one of Kocher's (15) cases the gangrene extended four inches and in one of Taendler's (16) six inches above the suture line. In a case not submitted to operation the diphtheritic deposits were found six feet above the constriction.

When death follows hernia, the symptoms of peritonitis are rarely absent. In the majority of cases, even of gangrene, there is no perforation within the abdomen, and the course of the peritoneal infection must have been through the macroscopically intact gut. That it may occur where the gut does not enter into the hernia has already been seen (case 1). It has long been known through Nepveu's (17) investigations that the fluid transudate in a hernial sac is rich in pathogenic organisms before gangrene has developed. Benneke (18) has recently shown that the bacteria readily pass through the wall of the parietic bowel and produce diffuse peritoneal infection. On microscopic sections he was enabled to trace their progress through the intestinal wall. From these metastatic infection in remote organs may ensue. The process is like that seen in other morbid conditions of the intestine; notably in typhoid fever and appendicitis, where peritonitis develops without actual perforation.

Equally important with the local, is the general condition of the subject of a strangulated hernia in determining the plan of procedure. When delay has brought the patient to the verge of collapse, when even the shock from prolonged anæsthesia cannot be ventured, *that* must be done which most readily gives relief to the strangulation. It may be the opening of a fecal abscess, the division of the stricture, or the rapid fixation of the gut in the wound. Whatever the procedure adopted in the condition indicated, the result will probably be the same—death within a few hours or days.

In most cases, however, the condition is less deplorable and evidently tolerant of a somewhat prolonged operation. It is in this class that choice must be made between the establishment of an artificial anus and resection of the bowel with immediate suture of the divided ends.

Unfortunately authorities are not to be relied on, for they are divided. In England, Baker, MacCormac, Banks, and Treves decidedly oppose the greater operation of resection. In this country the same opinions have been held unless they have been recently influenced by the reports of successful cases of excision by McCosh (19), Richardson (20), Dawbarn (21), and others. In Germany, Kocher's and Czerny's first successes were followed by many failures which frustrated the natural desire of surgeons to make primary excision the normal procedure in gangrenous hernia. Finally Reichel's (22) critical review of the statistics in 1883 made it appear that the preferable primary operation was enterostomy to be followed by a second operation for the closure of the preternatural opening. From the very first Kocher has remained steadfast to the ideal operation, and in Mickulicz he has recently found a most able supporter.

The advantages and disadvantages of the two procedures are almost apparent. If primary resection is successful the patient is well in from four to six weeks. If an artificial anus is successfully established a second operation of a very serious nature must follow. The artificial orifice is as large as the bowel and the mucous membrane is prone to prolapse. Such an opening never closes spontaneously.

While in a considerable number of cases the enterotome of Dupuytren might be successfully applied with the low mortality of five per cent. (Korte) (23), it will fail in many cases and be absolutely inapplicable in others. Again, according to Dupuytren it should not be used for two or three months after the primary operation. It is during this interval that the very greatest danger from artificial anus is encountered, that from progressive inanition. Recently Poulsen (24) has used it twelve and even nine days after the first operation.

It has not yet been established how much of the intestinal canal is essential to the maintenance of nutrition, but where the fistula is above the milk-part of the ileum rapid emaciation and death follow before any secondary procedure for closing it can be practiced. McCosh does not overrate the argument of statistics in the statement that the death-rate of all cases in which an artificial anus is made, including the operations for its relief, is fifty per cent. The danger from secondary resection and



enterorrhaphy is very considerable. Haenel mentions forty-three cases with sixteen deaths and two failures.

To be successful the artificial anus must be established in healthy bowel, else the dangers inherent in the afferent portion will not be removed nor will a free outflow from the intestine be secured. The only advantages therefore which can be claimed for this method are the rapidity with which it can be performed and the slight technical skill required in its performance. A further advantage is supposed to exist in the lesser danger connected with this as compared with the major procedure of immediate resection.

There is hardly a subject in surgery concerning which statistics are so much at variance as are those relating to gangrenous hernia. According to Korte of 111 cases treated by enterostomy eleven ended fatally. Herman (quoted by Haenel) mentions 83 cases with 7 deaths. On the other hand Weil (25) reports 15 cases with 13 deaths. Benno Schmidt places the mortality at 85.5 per cent. for the formation of an artificial anus as against 71.1 per cent. for primary resection.

F. A. Southern, surgeon to the Manchester Royal Infirmary, recently reports eighty-five cases of herniotomy with nine cases of gangrene. All of the latter died. In six an artificial anus was made; in three primary excision.

If statistics are of any value in solving the relative merits of enterostomy and primary excision, it is evident that the reports of scattered cases are far less weighty than such from a few and skilled operators and from hospital records where nothing is concealed. Such a tabulation has recently been made by Mickulicz (26) from seven large clinics of Germany and Switzerland. Of one hundred and sixty-eight cases of gangrenous hernia one hundred and nine died. Of ninety-four in which an artificial anus was made seventy-two died; mortality, seventy-six per cent. Of sixty-eight primary excisions thirty-two or forty-seven one-tenth per cent. died. Of six intermediary resections five died. It would appear from this that the mortality of primary excision is very much less than that of the lesser operation. But this can be accounted for by the certainty that the latter was often used as a last measure in conditions approaching collapse and therefore precluding the major operation.

The advantages of primary resection are patent. Its advantages are, in the time required for its performance and in the danger of peritonitis from imperfect technique. In a measure both can be overcome. The first of these is probably grossly exaggerated. With separation of the mesentery as indicated in the fourth case and its closure by suture to be followed by the continuous Lembert suture or by lateral anastomosis, not more than half an hour at most should be required for the enterorrhaphy. Complicated clamps, a separate row of stitches for mucous and serous tunics, interrupted sutures unnecessarily waste time. Where the continuous suture is used and appears weak at points a few supplementary stitches can easily be taken. Suturing the mesentery brings the intestinal ends naturally together and gives assurance that the most treacherous part of the suture, that near the mesentery, can be properly applied. The second danger is from injudicious selection of the lines for suture. As elsewhere in gangrenous processes the danger lies rather in removing too little than too much. If Kocher excised five and Kärberle six feet of intestine, a few inches more or less cannot be important. In acute cases where the calibre of the gut has not been long occluded and koproostasis is little if at all developed, an inch or two on each side of the constriction groove will probably bring the suture line in healthy tissue. Where the mesentery has not been included in the strangulation, the same favorable conditions may be expected. Where however much dilatation of the afferent gut exists, its thorough evacuation should precede the enterorrhaphy. After hernia, as after laparotomy for obstruction, it is fatal to return a distended gut to the abdomen. The second danger, that of septic infection of the peritoneum, can in a large measure be reduced by thorough irrigation of the sac before suturing; by careful handling of the gangrenous gut without the wound meanwhile protecting the peritoneum by gauze packing. Finally, the sutured intestine should be left just within the abdominal cavity and a radical cure should not be attempted. Mickulicz, whose success surpasses that of any other operator—21 cases with 14 recoveries—insists on the open treatment of these cases. Should fecal extravasation ensue from defective suture or other cause, it would naturally turn towards the wound whereby the danger of general peritonitis

would be largely averted. For from two to five days after the operation the sutured intestine remains where it is placed within the abdomen, and after that length of time the development of peritonitis is not probable. To hasten the process of wound repair, deep and superficial sutures might be drawn through the wound margins and kept over the gauze packing, to be tightened without anæsthesia after the danger line has been passed.

Between the extreme measures considered, others looking towards a compromise have recently been brought forward by a number of surgeons. Among these are the intermediary excision and suture of Riedel (27). The artificial anus is established in the usual way. After twenty-four or forty-eight hours the edges of the intestine are vivified and united by suture. In 1882 Bouilly (28) suggested excision and suture, the latter being purposely made imperfect at one point to guide the fecal extravasation. To avert the danger from imperfect suture, Hahn (29) follows the kelotomy with a median laparotomy. Through this wound he brings the divided ends of the bowel, thoroughly protecting the abdomen against infection by packing them in gauze. When the suture is completed the closed knuckle is kept in the wound and gauze splints until union is assured. The competency of the suture is certain after 24 hours, when the bowel is returned to the abdomen and the external wound closed. It is difficult to understand why the same procedure could not be carried out in the inguinal herniotomy wound. Nevertheless Hahn has had two successes with it, and in a third, reported by Kutschera (30), the result was equally satisfactory.

To overcome the danger from death from inanition Helferich (31) has recently combined enterostomy with an intestinal anastomosis above the constriction furrows. By this method two courses are open to the intestinal circulation and the closure of the artificial anus is greatly facilitated. The operation was done in two cases, one of which was successful, the fecal fistula closing spontaneously.

There is yet another class of cases in which the condition of the bowel is such that whereas gangrene is not yet present, it might through subsequent necrosis cause death if returned to the abdomen. Such a knuckle is a menace. Who has not seen it? Especially if operating by light both artificial and bad.



Bowel that is not at all doubtful in appearance will at times repay the trust placed in it by a perforation. Among 96 deaths after herniotomy, it was in 26 cases the result of returning intestine to the abdomen which subsequently perforated. In Hagedorn's clinic three deaths out of 15 resulted in the same way. To return doubtful intestine is unnecessarily jeopardizing life. To treat such intestine as radically as bowel already gangrenous is an extreme measure, not to be advocated. Fortunately the intestine can be retained in the wound for a number of days in gauze packing or by sutures. When its viability has been established it is an easy matter to return it to the abdomen. Graefe (32) recently reported a successful case in which the intestine was so retained for five days before replacing it. Should the dread of adhesions be feared, the intestine might be retained just within the abdomen by fixation sutures or by gauze. In the event of gangrene the fecal extravasation would course toward the external wound.

When in 1880 Czerny reported his first case of primary excision for gangrene, he believed that the operation would not displace the older operation of enterostomy. Although the last four years have brought forward success after success from primary resection, the dictum of Czerny still holds good. Each operation has its proper field. The boundary lines are becoming more clearly defined. Nevertheless it must always remain for the judgment and tact of the surgeon as individual cases arise to determine the proper procedure to be adopted. In operative surgery, as elsewhere, the ideal should be sought. This would make primary excision the normal procedure in gangrenous hernia, and only cogent reasons should cause the operator to refrain from striving for the ideal.

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